GETTING THE GROUNDWATER PICTURE

Objectives:

Students will:

- define groundwater,
- define aquifer,
- observe how water travels through soil and becomes groundwater,
- compare the movement of water through diverse substrates.
- explain what the watertable is, and
- discuss how groundwater water levels can fluctuate.

Materials:

- 2 large soda bottles with the bottoms cut off
- Rock and sand layered in the soda bottles as described
- A container of water
- A spray bottle
- Measuring cup
- A small piece of cheesecloth or pantyhose

Background:

Groundwater is one of the Earth's most valuable natural resources. Many people think of groundwater as underground lakes or streams. These primarily exist where an area is underlain by cavernous limestone or lava tubes and will be discussed later. Most groundwater is simply water below the land surface that is filling all the spaces between rock grains or in the cracks and crevices in the rock. Groundwater is brought from the earth as well water.

Scientists use the word aquifer to describe the location of groundwater. An aquifer is an underground formation that stores and transmits water. Aquifers come in all shapes and sizes. Some may cover hundreds of miles while others may only cover a few squire miles. Some areas may contain several aquifers located at different depths. The water quality and quantity in aquifers vary; even the age of the water varies.

When specialists analyze the quality of groundwater, they consider land-use practices in the watershed. If pollution, such as hazardous waste, chemicals, heavy metals, etc. collect on the surface of the ground, rain or runoff can carry these substances into the groundwater.

How groundwater moves varies based on the rock material in the geologic formation where the water is located. Gravity and the pressure of overlying water cause the water to move. The water moves from a recharge area (where rain, streams, lakes, or karst areas carry it into the ground) to a discharge area (where the water leaves the ground via springs, lakes, streams, etc). Groundwater moves toward areas of least resistance.

Procedure:

1. Using the 2-litter plastic bottle, construct a groundwater model. Cut off the bottom of the bottle. Cover the opening of the bottle with cheesecloth or a piece of old pantyhose. Put



- the lid back on the bottle. The opening will become the bottom of the groundwater model.
- 2. Place one cup of sand in the model. Have the students guess how much water the sandy aquifer will hold. Measure your guess in a measuring cup and show it to the students.
- 3. Slowly pour the measuring cup of water, or rain, over the sand. What happens? Does the water soak in? Can the jar filled with sand hold water? Why? How much water will the sand aquifer hold?
- 4. Pour more water, (rain) over the sand. Watch the top of the aquifer rise until it forms a lake on the surface after the aquifer becomes saturated with the water from the rain.
- 5. Drain the water from the model by opening the lid on the bottom and letting the water seep out. Watch the aquifer recede as the water leaves the bottle. Pour the sand on a paper towel to dry.
- 6. Line the bottom of the model with larger rocks, next add the medium sized pebbles, then smaller pebbles, and last the sand. Using the spray bottle, (rain) spray water on the model until the sand is saturated and the water begins to seep through to the bottom of the bottle.
- 7. At various intervals, have the students stop pouring water onto the model. Ask the students to locate the top of the aquifer (called the watertable).
- 8. Discuss how features on the surface could change how water enters the aquifer. (Asphalt roads, concrete parking areas won't allow water to seep into the ground. Vegetation might use the water.)

Optional:

You may want to use material to simulate soil and vegetation on the top of your model. For example, you could use a cloth on top of the sand to represent the absorbing nature of soil and vegetation.